

# **State Energy Summit**

**Montgomery Bell State Park**

**August 17**

**Dickson, TN**

**(Adapted from EVS 23 Presentation)**

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# **ALTERNATIVE FUEL VEHICLES TO RUN OFF SUN AND HYDROGEN FROM WATER UTILIZING THE GRIDLINE**

# ***OVERVIEW***

# **MTSU Alternative Research Alternative Fuels For:**

- **Cleaner Environments- Less to Near Zero Hydrocarbons**
- **Agriculture Markets - Increases Sales of Corn, Soybean and Other Oil Crops**
- **U.S. Economic Stability - Help Balance Export / Import Markets, Less Dependence on Overseas Oil**
- **Maintain World Peace - No reason to Battle over Foreign Oil; 60% of World's Oil comes through a 7 mile strip in Persian Gulf**

**Ethanol**



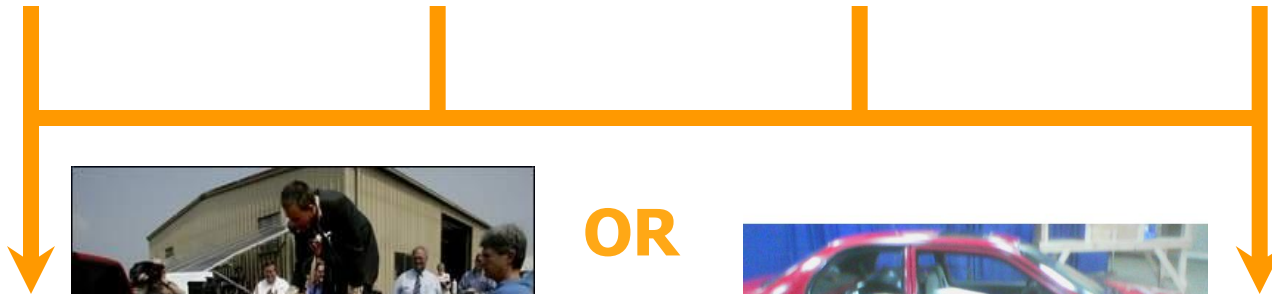
**Soybean Oil**



**Methane**



**Hydrogen from Water**



**OR**



**Electric Hybrid with Sun & Hydrogen from Water**



**Sun & Water Car**

# ***THE PAST***

### MTSU Ethanol Car (26,000 Miles Off Pure Ethanol)



# ETHANOL CAR



### MTSU Methane Car



### MTSU Biodiesel Car

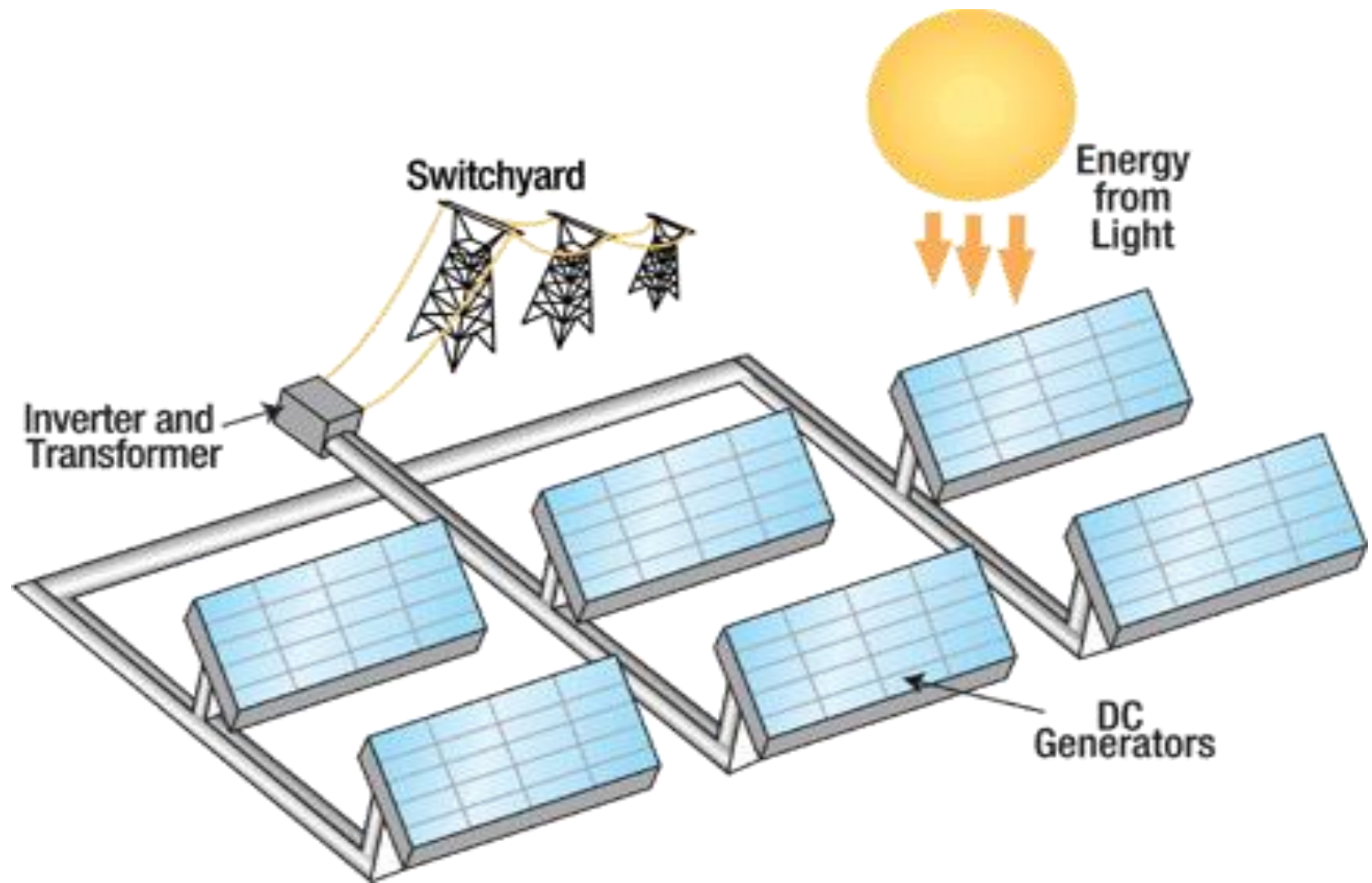


# BIODIESEL



# ***THE PRESENT***

# TVA GREEN POWER SWITCH



### **10 Kilowatt Solar Array**



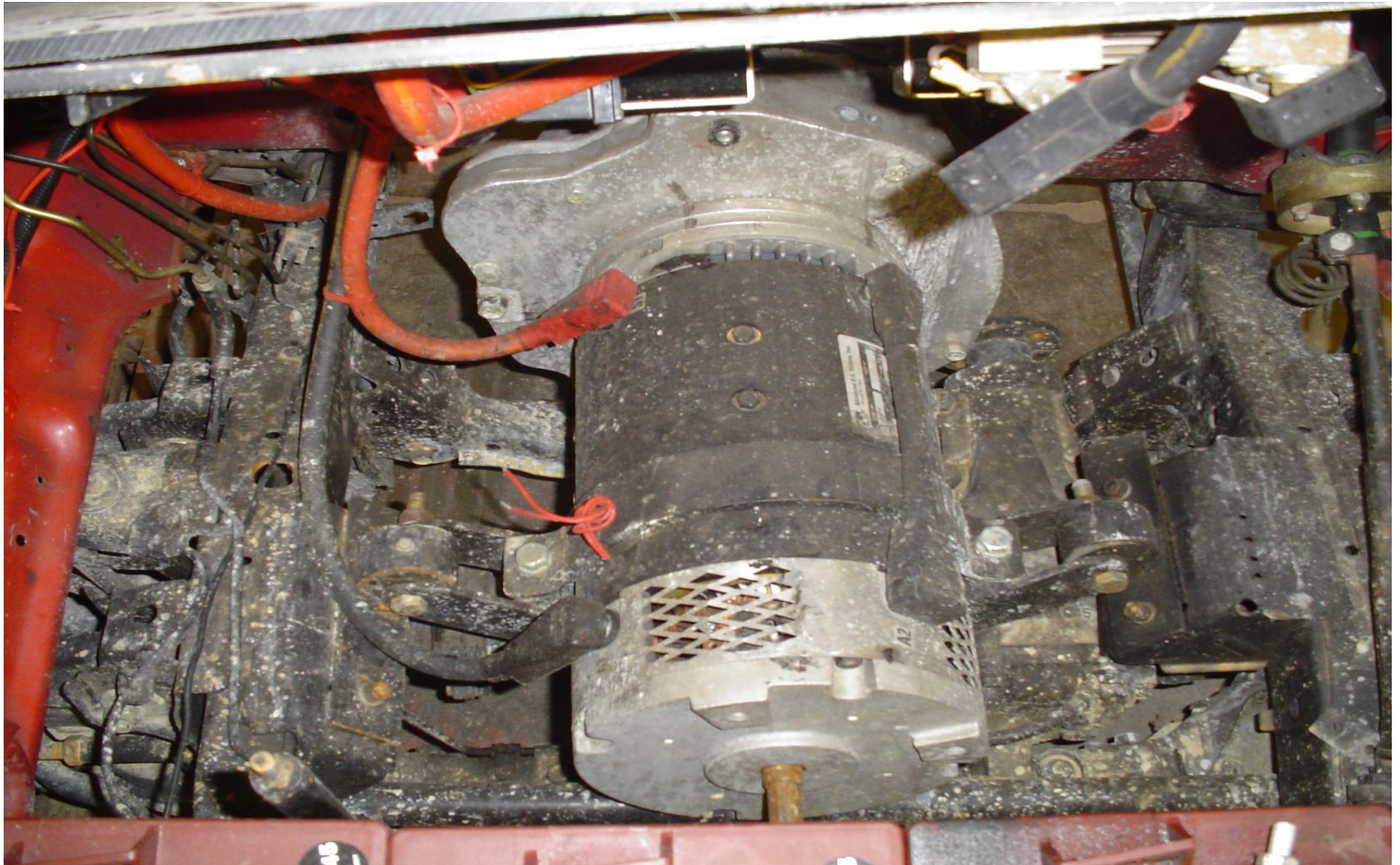
### Solar/Hydrogen/Electric Hybrid Truck "Forces Of Nature"



### Solar/Hydrogen/Electric Truck



### **DC Electric Engine**



# **RUNNING ENGINES OFF HYDROGEN FROM WATER WITH ENERGY FROM THE SUN**

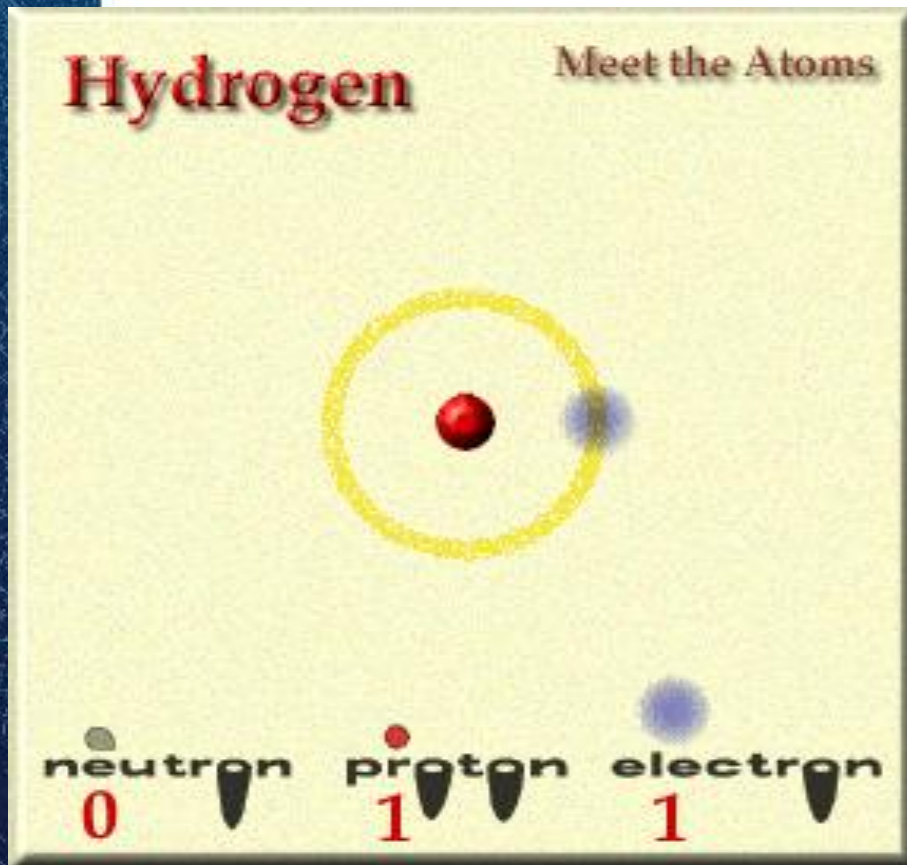
### MTSU Hydrogen Car



### MTSU Hydrogen Car



# Hydrogen Fuel



The benefits of hydrogen fueling are many. The greatest being that as long as the Earth exist, we will still have water. Other benefits are: cleaner environment, equalized trade imbalance, greater potential for world peace.

### Water De-ionizing Unit



# Proton Electrolysis Unit



One way to produce hydrogen is through the electrolysis of water. Water is split into its individual components of hydrogen and oxygen. The oxygen is released and the hydrogen is retained and stored for future use for fueling a hybrid car. The electrolysis unit on the left is solar powered to convert water to hydrogen.

### Hydrogen Electrolysis Unit



# Production of Hydrogen

When the electrolysis unit is producing hydrogen from water, the hydrogen is run through a pipe and into these tanks to be stored for later use to fuel the automobile. The gauge reads the amount of hydrogen in the tanks in terms of PSIs, or pounds per square inch. A maximum of 200 PSIs can be stored in the two 500 gallon tanks.



# Compressing Hydrogen

The Hydrogen compressor at the bottom right takes the Hydrogen from the two 500 gallon Hydrogen storage tanks with 200 PSI of Hydrogen and compresses the Hydrogen to 6,500PSI. It takes eight K-Cylinders of 6,500PSI of Hydrogen to fill one Carbon Wrapped Tank.



# Fueling



The hydrogen tank is located in the back of the Hydrogen car. This tank holds 4.2kg of Hydrogen at 5,000 PSI, 1kg of Hydrogen is the same mileage as one gallon of Gasoline. The fueling hose attaches to the tank and hydrogen flows through until it is full.

# Hydrogen Car

(Two 4.2 KG Hydrogen carbon wrapped tanks has range of 300 miles)





AC-DC Conversion System



Outside Electronic Computerized Meter  
(DEPOSIT)



Inside Use Meter  
(WITHDRAWAL)



Battery Charger



TVA Green Power Switch  
10 kw Solar Unit



26-12V Gel Cell Batteries

# 2009 MTSU VAZER

Energy Source:  
Sun & Hydrogen from Water



2009 MTSU VAZER



22 Hp Daihatsu  
Hydrogen Engine



DC Generator



Hydrogen Electrolysis Unit



Hydrogen Storage Tank  
(200 PSI)



Hydrogen Storage System  
(6000 PSI)



Hydrogen Filler Connection



On-Board Hydrogen Storage System

# PLUG-IN SOLAR/ELECTRIC HYDROGEN HYBRID

## ENERGY SOURCES: *SUN & WATER*



2008 Toyota Prius



For More Information,  
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### MTSU Built Hydrogen Car

(Set Hydrogen land speed record at Bonneville Salt Flats, Wendover Utah in 1991)



# Hydrogen Car



The process of introducing hydrogen powered vehicles into our transportation system has begun. These vehicles run just as smooth, gain as much speed and travel just as far as most gas powered vehicles. Most automotive companies now have a Hydrogen powered vehicle.

# **Benefits of Hydrogen Fueling**

Hydrogen fuels produced and used in an appropriate way is a viable option for alternative fuels in transportation for the following reasons:

- Environmentally conscience
- Increased security of energy supply
- Considerable renewable production potential
- Allow for smooth transition from fossil to 100% renewable energy sources with an appropriately adapted flex fuel vehicle.

# The Future

# **Flex-Fuel Plug-In Hybrid: Sun, Hydrogen from Water, Electric, Ethanol, and Gasoline**



# ***EVS 23***

December 2 – 5, 2007

**SUSTAINABILITY:  
THE FUTURE OF TRANSPORTATION**

ANAHEIM, CALIFORNIA USA

## The End or Is This The Beginning?

HOSTED BY:



Electric Drive Transportation Association

In partnership with the World Electric  
Vehicle Association (WEVA)